

## (12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
22 April 2004 (22.04.2004)

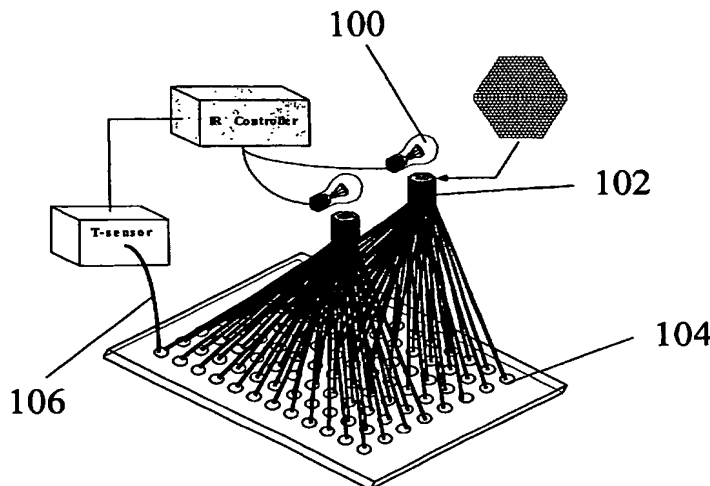
PCT

(10) International Publication Number  
**WO 2004/033099 A2**

- (51) International Patent Classification<sup>7</sup>: **B01L** (74) Agent: GREENBAUM, Michael, C.; Blank Rome LLP, 600 New Hampshire Avenue, N.W., Suite 1100, Washington, DC 20037 (US).
- (21) International Application Number: PCT/US2003/031806
- (22) International Filing Date: 8 October 2003 (08.10.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 60/416,927 8 October 2002 (08.10.2002) US
- (71) Applicant (for all designated States except US): UNIVERSITY OF VIRGINIA PATENT FOUNDATION [US/US]; 1224 West Main Street, Suite 1-110, Charlottesville, VA 22903 (US).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): LANDERS, James, P. [US/US]; 633 Nettle Court, Charlottesville, VA 22903 (US).
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:  
— without international search report and to be republished upon receipt of that report

[Continued on next page]

(54) Title: METHODS AND SYSTEMS FOR MULTIPLEXING IR-MEDIATED HEATING ON A MICROCHIP



(57) **Abstract:** The present invention relates to methods and systems for rapid multiplexed heating of a plurality of small volume samples on a microchip. More specifically, the present invention relates to methods and systems for non-contact temperature cycling of the samples using infrared (IR)-mediated heating of small, micro to nanoliter, volume samples, wherein each cycle can be completed in as little as a few seconds. Depending on the system used, the present invention involves a spinning microchip or an immobile microchip having a plurality of micro-heating areas thereon. In the case of the spinning chip, the micro-heating areas are located in a circular configuration on the chip, so the micro-heating areas can be accessed by static heating source(s) by spinning the microchip. In case of the immobile microchip, fiber optics are used to direct radiation from a heating source or multiple heating sources directly to the micro-heating areas on a microchip.